

Table Rock Lake

Region - Ozark Highlands

Table Rock Lake is a 43,100 acre Army Corps of Engineers reservoir located in southwest Missouri. This lake is in the White River system and is preceded upstream by Beaver Lake in northwest Arkansas. The lake consists of a long, winding main branch and three major arms. Kings River and Long Creek flow north out of Arkansas to enter Table Rock Lake while the James River flows south from the central Ozark Highlands Region. The majority of the lake's watershed is forested, but development around the lake and urban areas on the lake's tributaries threaten water quality.

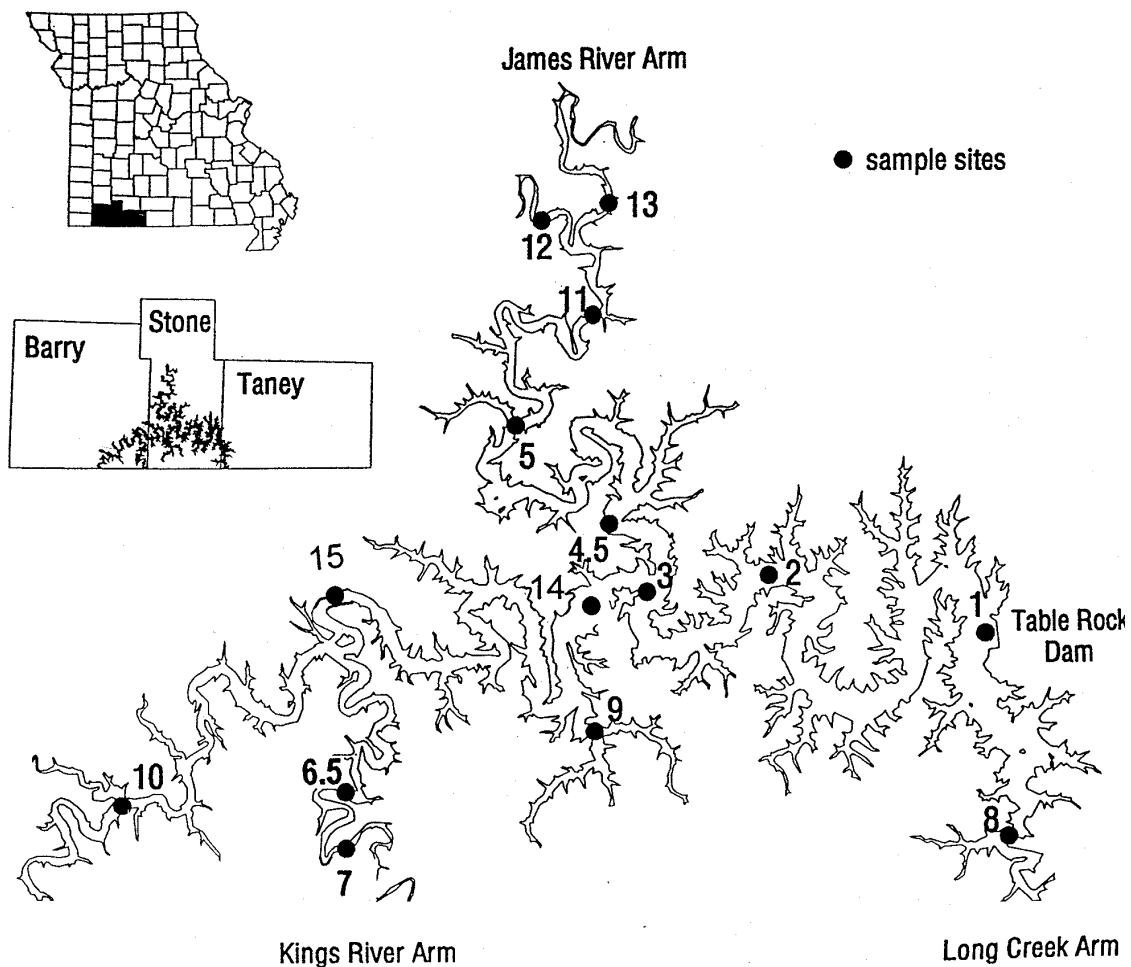


Figure 46. Location of Table Rock Lake sample sites.

Data was collected at 18 sites on Table Rock Lake during 1999. Monitoring was limited to Secchi transparency readings at three of the sites. Six Secchi readings were taken at the Viola site on the Kings River Arm. Sites at the mouths of Schooner and Fisher creeks (near Kimberling City) each had four Secchi readings recorded.

Sites monitored for all parameters had at least seven samples collected with the exception of Site 14 which was sampled six times and sites 5 and 11 which were each sampled twice. Due to the low number of samples, sites 5 and 11 were not included in the figures comparing sites across the lake.

Table 22. Trophic classifications for 1999 based on average phosphorus, nitrogen and chlorophyll values.

| Main Lake Channel | Tributaries | James River Arm |
|-----------------------|--------------------------|----------------------|
| Site 1 - oligotrophic | Site 6.5 - eutrophic | Site 4.5 - eutrophic |
| Site 2 - mesotrophic | Site 7 - eutrophic | Site 13 - eutrophic |
| Site 3 - mesotrophic | Site 8 - mesotrophic | |
| Site 14 - mesotrophic | Site 9 - mesotrophic | |
| Site 15 - mesotrophic | Site 12 - hypereutrophic | |
| Site 10 - mesotrophic | | |

- ▶ Conditions ranged from oligotrophic to hypereutrophic during 1999.
- ▶ Sites in the James River represent the full range of eutrophic conditions. (See page 8 for trophic criteria.) Site 13 was almost hypereutrophic while Site 4.5 was near mesotrophic conditions.

Table 23. Descriptive statistics from the main lake channel sites on Table Rock Lake - 1999.

| Parameter | | Site 10 | Site 15 | Site 14 | Site 3 | Site 2 | Site 1 |
|------------------------------------|---------|---------|---------|---------|--------|--------|--------|
| Nitrogen ($\mu\text{g/L}$) | average | 359 | 276 | 437 | 441 | 336 | 286 |
| | median | 355 | 280 | 315 | 335 | 300 | 260 |
| | minimum | 250 | 220 | 230 | 200 | 220 | 180 |
| | maximum | 520 | 310 | 930 | 940 | 610 | 530 |
| Phosphorus ($\mu\text{g/L}$) | average | 16 | 13 | 13 | 12 | 13 | 9 |
| | median | 16 | 12 | 12 | 13 | 11 | 9 |
| | minimum | 12 | 11 | 8 | 8 | 9 | 6 |
| | maximum | 26 | 16 | 21 | 18 | 17 | 11 |
| Chlorophyll ($\mu\text{g/L}$) | average | 11.0 | 13.4 | 11.0 | 9.3 | 9.5 | 5.1 |
| | median | 7.5 | 13.1 | 11.7 | 9.5 | 8.9 | 4.2 |
| | minimum | 3.6 | 8.6 | 6.1 | 3.6 | 5.5 | 3.3 |
| | maximum | 27.8 | 21.6 | 16.0 | 17.5 | 15.5 | 8.5 |
| Secchi (inches) | average | 88 | 74 | 67 | 81 | 91 | 127 |
| | median | 82 | 75 | 71 | 67 | 78 | 105 |
| | minimum | 61 | 60 | 56 | 48 | 60 | 84 |
| | maximum | 128 | 87 | 73 | 170 | 192 | 216 |

- ▶ Median nitrogen values were comparable for all main lake sites. Higher averages for sites 3 and 14 (and to a lesser extent sites 2 and 10) were due to early season samples with elevated nitrogen levels. Site 15 was not sampled until late June, so no elevated nitrogen values were recorded.
- ▶ Phosphorus values for the middle four main lake sites were extremely comparable. Site 10 had a little more phosphorus than the middle sites while levels were lower at the dam (Site 1).
- ▶ The highest chlorophyll values in the main lake channel occurred in the upper lake, with the maximum value being measured at Site 10. Site 15 had the highest average and median values. Moving towards the dam, chlorophyll values tended to decrease and become less variable.
- ▶ Secchi transparency readings reflected chlorophyll levels with the deepest Secchi readings corresponding to the lowest chlorophyll concentrations.
- ▶ Secchi readings taken at the mouths of Fisher and Schooner creeks averaged 85 and 87 inches respectively. These values were similar to the average at

nearby Site 2.

Table 24. Descriptive statistics from sites on the James River Arm of Table Rock Lake - 1999.

| Parameter | | Site 13 | Site 11* | Site 5* | Site 4.5 |
|-----------------------|---------|---------|----------|---------|----------|
| Nitrogen (µg/L) | average | 1184 | 713 | 550 | 533 |
| | median | 1040 | | | 375 |
| | minimum | 710 | 585 | 520 | 190 |
| | maximum | 2310 | 840 | 580 | 1020 |
| Phosphorus (µg/L) | average | 97 | 57 | 41 | 17 |
| | median | 88 | | | 15 |
| | minimum | 70 | 52 | 34 | 9 |
| | maximum | 137 | 62 | 48 | 31 |
| Chlorophyll (µg/L) | average | 37.4 | 35.3 | 23.1 | 10.8 |
| | median | 44.5 | | | 10.7 |
| | minimum | 2.6 | 25.5 | 21.3 | 5.0 |
| | maximum | 68.0 | 45.1 | 24.9 | 17.2 |
| Secchi (inches) | average | 36 | 35 | 43 | 69 |
| | median | 36 | | | 71 |
| | minimum | 31 | 32 | 37 | 53 |
| | maximum | 40 | 37 | 48 | 98 |

* These sites were only sampled twice so direct comparisons with other sites may not be valid.

- ▶ Nitrogen displayed a notable gradient in the James River Arm, with the average value at Site 13 being more than twice that found at Site 4.5.
- ▶ The gradient for phosphorus was more dramatic as the average for Site 13 was more than five times that of Site 4.5.
- ▶ Chlorophyll mimicked the nutrients with the average being 3.5 times higher at Site 13 than Site 4.5.
- ▶ Secchi readings were stable at Site 13, ranging only nine inches. Values at Site 4.5 were deeper but more variable.
- ▶ Average values for sites 5 and 11 were generally between those of sites 4.5 and 13.

Table 25. Descriptive statistics from tributary sites on Table Rock Lake - 1999.

| Parameter | | Site 12 | Site 9 | Site 8 | Site 7 | Site 6.5 |
|------------------------------------|---------|---------|--------|--------|--------|----------|
| Nitrogen ($\mu\text{g/L}$) | average | 1375 | 424 | 385 | 681 | 418 |
| | median | 1190 | 310 | 260 | 735 | 340 |
| | minimum | 940 | 200 | 250 | 420 | 250 |
| | maximum | 2920 | 740 | 1050 | 940 | 840 |
| Phosphorus ($\mu\text{g/L}$) | average | 74 | 11 | 13 | 75 | 43 |
| | median | 36 | 11 | 12 | 71 | 29 |
| | minimum | 12 | 9 | 10 | 40 | 21 |
| | maximum | 323 | 13 | 21 | 124 | 131 |
| Chlorophyll ($\mu\text{g/L}$) | average | 75.3 | 8.8 | 9.2 | 36.3 | 16.5 |
| | median | 3.3 | 6.6 | 7.2 | 33.0 | 15.7 |
| | minimum | 0.8 | 3.9 | 4.1 | 4.6 | 6.8 |
| | maximum | 518.5 | 16.4 | 21.4 | 75.3 | 28.1 |
| Secchi (inches) | average | 41 | 102 | 75 | 28 | 47 |
| | median | 44 | 63 | 72 | 27 | 50 |
| | minimum | 14 | 52 | 54 | 10 | 24 |
| | maximum | 63 | 283 | 96 | 44 | 53 |

- ▶ Nitrogen concentrations varied widely in the tributaries. Some sites were comparable to the main lake sites while Site 12 in Flat Creek had the highest nitrogen reading in 1999.
- ▶ Sites 8 and 9 had phosphorus levels that were indistinguishable from the main lake values.
- ▶ Both Kings River sites (7 and 6.5) as well as the Flat Creek site (12) had phosphorus values well above the main lake sites.
- ▶ Chlorophyll levels at Site 7 in the Kings River were very comparable to Site 13 in the James River.
- ▶ The chlorophyll value of 518 $\mu\text{g/L}$ at Site 12 was the highest reading measured on Table Rock Lake (or any other lake) by the LMVP since the program began in 1992.
- ▶ The minimum Secchi reading of 10 inches at Site 7 corresponded to a chlorophyll value of 4.6 $\mu\text{g/L}$. This low chlorophyll reading suggests that soil materials in the water were impacting water clarity.

- ▶ Note the longitudinal gradient in the Kings River Arm (sites 7 and 6.5) for all parameters.
- ▶ Average Secchi reading at the Viola site on the Kings River was 62 inches. This value represents a gain of 15 inches in water clarity from Site 6.5.

Table 26. Trophic assessment of sites on Table Rock Lake based on average chlorophyll values.

| Site | 1992 | 1993 | 1994 | 1995 | 1996 | 1997 | 1998 | 1999 |
|------|------|------|------|------|------|------|------|------|
| 1 | | M | M | E | O | M | M | M |
| 2 | | M | E | E | M | M | M | E |
| 3 | E | E | E | E | M | M | M | E |
| 4.5 | | | | E | M | M | E | E |
| 5 | E | E | | E | E | E | E | |
| 6.5 | | | | | E | E | E | E |
| 7 | | | | | E | E | E | E |
| 8 | | M | E | E | M | M | E | E |
| 9 | | | E | E | M | M | M | E |
| 10 | | | M | E | M | M | M | E |
| 11 | | | | E | E | E | E | |
| 12 | | | | H | E | E | H | H |
| 13 | | | | H | H | H | H | E |
| 14 | | | | | | | | E |
| 15 | | | | | | | | E |

O = Oligotrophic

M = Mesotrophic

E = Eutrophic

H = Hypereutrophic

- ▶ Only four sites have been classified in the same trophic category each year.
- ▶ There does not appear to be any trends of changing trophic status across the lake. (See page 8 for more information on trophic assessments.)

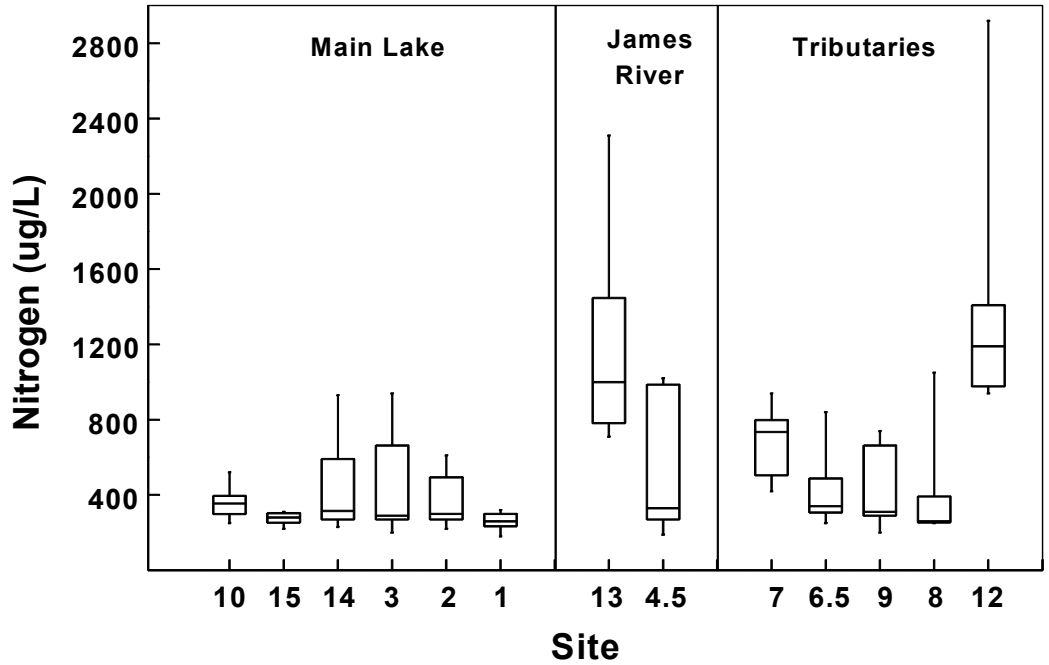


Figure 47. Nitrogen values for Table Rock Lake - 1999.

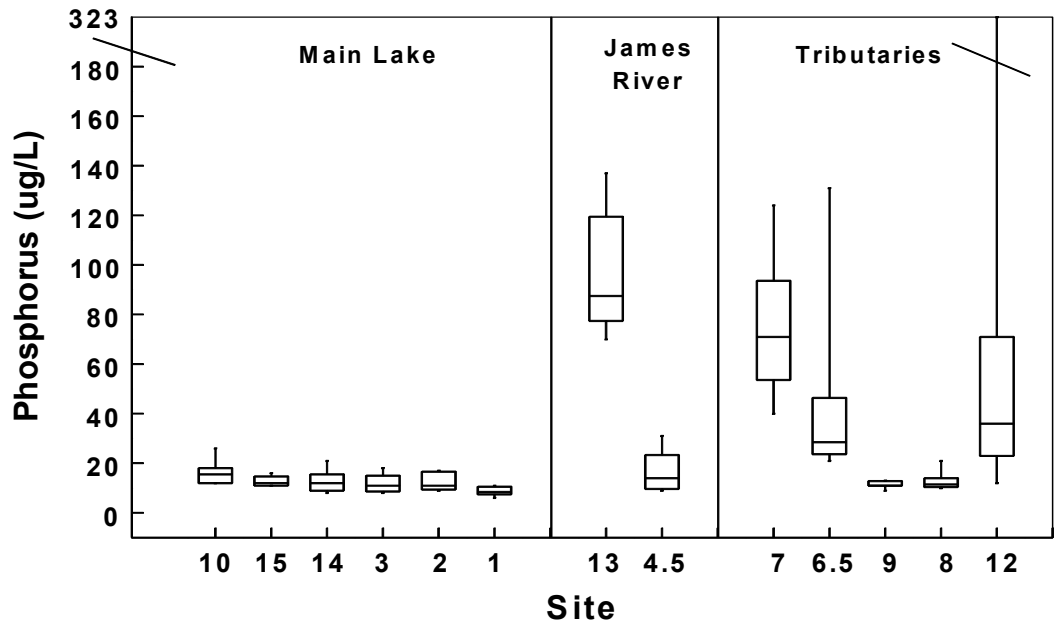


Figure 48. Phosphorus values for Table Rock Lake - 1999.

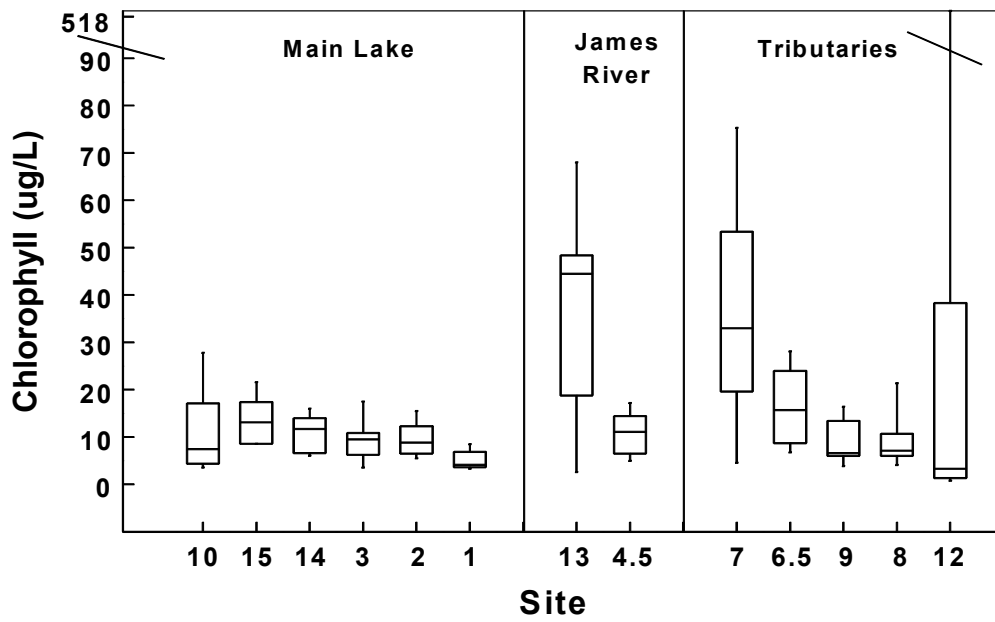


Figure 49. Chlorophyll values for Table Rock Lake - 1999.

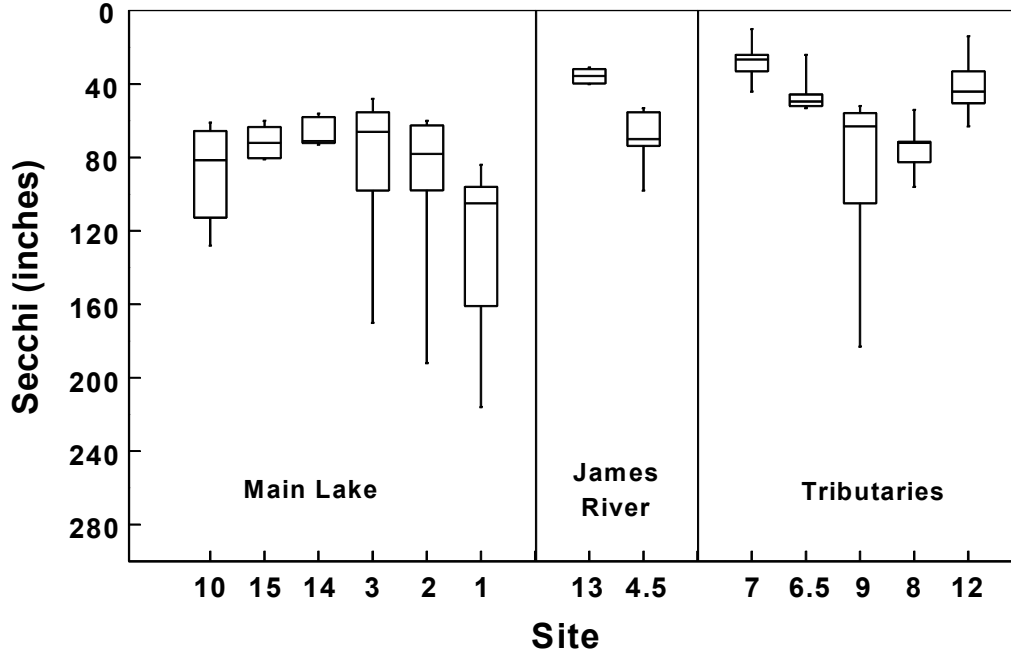


Figure 50. Secchi values for Table Rock Lake - 1999.